UCSI UNIVERSITY
The University. The Experience

Igneous , Metamorphic and Sedimentary Petrology
EG203

Course Outline

Subject Name	Igneous , Metamorphic and Sedimentary Petrology
Subject Code	EG 203
Status	major
Credit Hours	4
Semester / Year	1-2
Pre-requisite	none
Teaching Method	Lectures + laboratory experiments
Assessment	
Test 1	10%
Mid Term Examination	20%
Test 2	10%
Laboratory	10%
Final Examination	50% The course has five assessment components as described above. Test 1: it will be conducted on week 5 of the semester. The test 1 will usually have 4 questions of approximately 15 minutes duration each. Midterm exam: it will be conducted on week 9 of the semester. The midterm exam will have 4 questions of approximately 20 minutes duration each. Test 2: will be conducted on week 12 of the semester. The test 2 will usually have 4 questions of approximately 15 minutes duration each. Laboratory component: it is compulsory to attend all the lab sessions; failing to do so will result in complete failure in the subject. The student will carry out the experiments described below and submit a report to the lab tutor at the end of the semester. Final Exam component: it will consist of 5 questions of 3 hours duration.
40% ruling:	Applicable
Supplementary exam:	Applicable (on the final exam only)

Objectives	The course aims to teach the following topics : 1. Examination of materials from which the Earth is made. 2. Techniques of identifying and interpreting these materials. 3. Physical processes that operate in the Earth' interior; i.e., igneous and metamorphic processes and processes leading to earthquakes 4. Physical processes that operate on and near the Earth' surface such as: ➢ Weathering ➢ Erosion ➢ Deposition ➢ Groundwater 5. Theory of Plate Tectonics and the evidence supporting it. 6. Interactions between on going geologic processes and humans
Learning Outcome	Upon completion of this module , student should be able to : 1. Acquire: ➢ Skills for the identification, description, and classification of igneous and metamorphic rocks. ➢ Skills for the interpretation of field structures, textures and mineral assemblages. ➢ Skills for the synthesis and interpretation of compositional variations of igneous and metamorphic rocks. 2. Appreciate the changes that occur within the deep parts of the Earth (the lithosphere and asthenosphere) and how deep processes affect the dynamic evolution of the Earth as a system. 3. Have ability to : ➢ Select appropriate data from a range of sources and develop appropriate research strategies using personal observational, descriptional, and numerical skills. ➢ Take responsibility for own learning with minimum direction.

Syllabus & Contact Hours	Module Content	Lecture	Tutorials	Laboratory
	1. Mineralogical Classification	3		
	▪ Definitions			
	▪ Minerals of Igneous Rocks			
	▪ IUGS Classification of plutonic igneous rocks			
	2. Chemical Classification	4		
	▪ Chemical Constituents of Igneous Rocks			
	▪ Chemical Classification			
	▪ CIPW Normative Analysis			
	3. Physical Nature Of Magmas	5		
	▪ Concept of Magma			
	▪ Density, Temperature, Specific Heat, Viscosity			
	▪ Solubility and Importance of Volatiles			
	▪ Pegmatites and Aplites			
	▪ Volcanism			
	4. Magmatic Processes	5		
	▪ Magmatic Differentiation			
	a. Fractional Crystallization			
	i. Liquid Displacement			
	i. Filter Pressing			
	i. Flowage Segregation			
	i. Dilation-Autointrusion			
	▪ Liquid Immiscibility			
	▪ Vapor Transport			
	▪ Diffusion			
	▪ Magma Mixing			
	▪ Assimilation			

5. Plate Tectonic Environments	4		
■ Oceanic Lithosphere Rocks			
■ Mid-Ocean Ridges			
■ Basalts			
a. Convergent Margin Rocks			
b. Ocean-Ocean Plate Margins			
c. Ocean-Continental Plate Margins			
d. Continent-Continent Plate Margins Rocks			
e. Continental Lithosphere			
i. Flood Basalts			
ii. Layered Mafic Intrusions			
iii. Komatiites			
iv. Continental Rifts			
v. Anorgenic Granitoids			
vi. Anorthosites			
vi. Kimberlites and Lamproites			
6. Introduction To Metamorphic Petrology	4		
■ Types of Metamorphism			
■ Pressure and Temperature			
■ Classification of Metamorphic Rocks			

Syllabus & Contact Hours	7. Metamorphic Facies Concept	2		
	■ Isograd Reactions			
	■ The Major Facies			
	8. Textures Of Metamorphic Rocks	4		
	■ Metamorphic Foliation			
	■ Metamorphic Lineation			
	■ Porphyroblast Development and Textures			
	■ Polymetamorphic Textures			
	9. Metamorphic Equilibrium Diagrams	5		
	■ ACF, AKF, AFMK Diagrams			
	■ Petrogenetic Grids and Metamorphic Reactions			
	■ Bathozones and Bathograds			
	■ Pressure-Temperature-Time Paths			
	10. Sedimentary Rocks	6		
	■ Texture: grain size, shape, type and surface texture			
	■ Sandstones: classification , and cementation			
	■ Mudrocks: Fissility, Texture,Color, Mineralogy			
	■ Carbonate Rocks: mineralogy , sediment components, dissolution, cementation, recrystallization and silicification			
Total Hours		42		28

Textbook	Simon & Schuster's Guide to Rocks and Minerals, by Simon & Schuster, Publisher: Simon & Schuster (10/01/1978), ISBN: 0671244175ISBN13: 9780671244170
Reference Books	1. Smithsonian Handbooks: Rocks & Minerals, by Chris Pellant, Publisher: DK ADULT; 1st edition (September 1, 2002) , ISBN-10: 0789491060 ,ISBN-13: 978-0789491060 . 2. The Practical Geologist: The Introductory Guide to the Basics of Geology and to Collecting and Identifying Rocks, by Dougal , Publisher: Fireside (August 15, 1992), ISBN-10: 0671746979, ISBN-13: 978-0671746971

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